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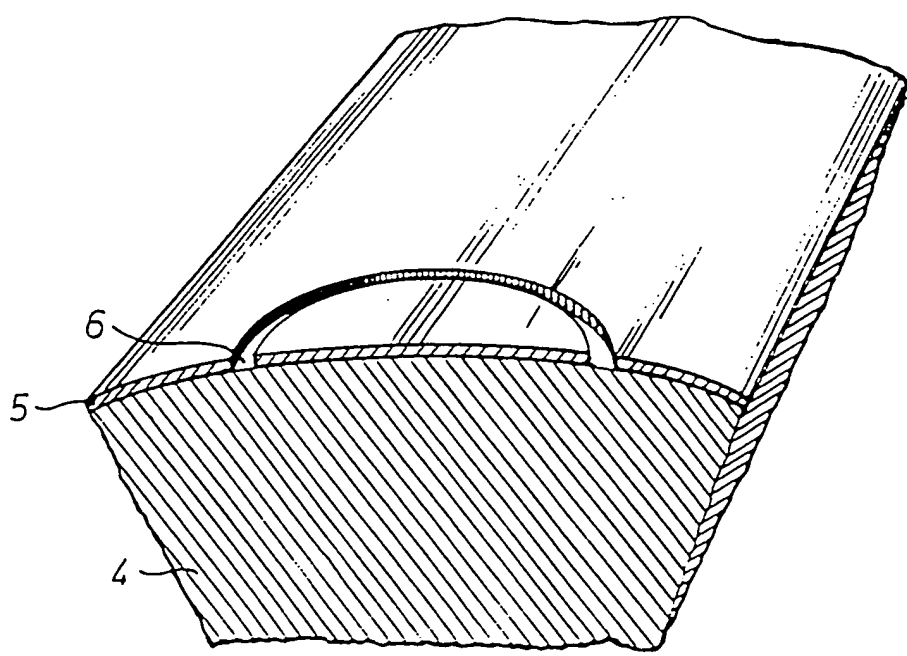
(54) Offset printing

(57) Cylinder provided with printing pattern for reproduction according to offset-printing comprising a layer (4) consisting of a lipophilic material which is coated on the outside with a very thin layer (5) of hydrophilic material. The hydrophilic material layer (5) is broken through within areas which correspond to the actual printing pattern so as to expose active ink transferring surface portions (6) of the underlying layer (4) serving as a printing medium within the said areas.

Such a printing pattern is obtained preferably in that a cylinder surface consisting of lipophilic material is coated first with a very thin, wholly covering coating (5) of hydrophilic material, e.g. through vacuum precipitation, whereupon this coating (5) is removed within areas corresponding to the actual printing pattern, e.g. through burning off with the help of a computer-controlled laser beam, so as to expose corresponding active, inktransferring surface portions (6) of the underlying lipophilic cylinder layer (4) within the said areas.

A cylinder having a thermoplastics lipophilic layer overlain by an evaporated film of aluminium is disclosed.

Fig. 2



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Fig.1

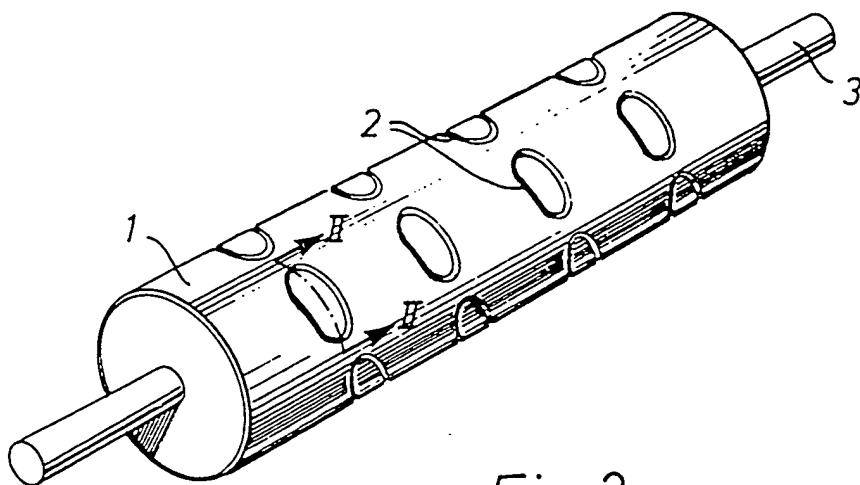
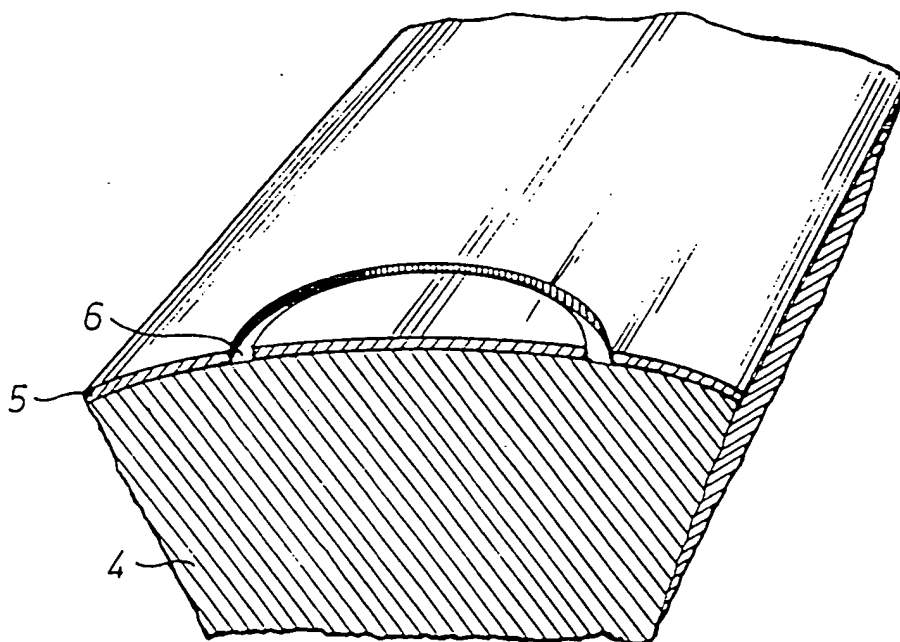


Fig.2



OFFSET PRINTING

The present invention relates to offset printing and includes cylinders for use as plate cylinders, methods of making such cylinders and in particular  
05 cylinders provided with printing patterns for reproduction through offset printing, and a method for providing a cylinder surface with such a printing pattern. The invention relates also to printing machines and methods of printing.

10 Offset printing plates are manufactured conventionally with the help of a photographic process in which text and declarations present on a drawing or film are transferred onto a printing plate surface which thereafter is etched or treated in some other  
15 manner so that exposed portions are removed. This may be done, for example, in that the surface of the printing plate has a coating of photosensitive, lipophilic material which, after exposure to light, is chemically altered so that exposed portions can be  
20 removed whilst unexposed portions remain intact.

On printing, for example, blanks for packing containers, material webs of plastic-coated paper are used frequently which are so wide that a number of packing blanks can be arranged alongside each other.  
25 The printing of such a wide web brings about, of course, a raised capacity and improved economy. Since

packing blanks in particular are often provided with projecting lugs and thus do not have any straight edge contour, it is necessary to displace the blanks in relation to one another so as to avoid, or at least to minimize, wastage. Thus it is attempted to displace the blanks so in relation to one another that a projecting lug on one blank may be fitted into a corresponding recess on an adjoining blank, and since the blanks as a rule are identical, it is often possible through mutual shifting of the placings of the blanks to achieve a wholly wastage-free or at least minimum-wastage production of blanks. This implies also that the printing plates for the printing of blanks have to be displaced in relation to one another, since the printing pattern of the plates has to be adapted to the location of the displaced blanks on the web.

This has been solved previously in that, for example, a number of separate printing plates was mounted on a carrier cylinder with a mutual displacement corresponding to the displacement which is desired for the pattern on the printed web. This printing plate composition work is very exacting and takes a long time, since the individual printing plates have to be placed in relation to one another with very great precision. This, among other things, requires exceptional expertise from those carrying out the

mounting of the printing plates on the carrier cylinder. The known technique also meant that large quantities of material had to be discarded on the grounds of inadequate precision in the mounting work.

05       The present invention provides a cylinder for use in offset printing comprising a substrate of lipophilic material to serve as a printing ink transferring medium, and an over layer covering said substrate and consisting of hydrophilic material, said  
10 over layer being selectively removable to expose a desired pattern of printing ink transferring regions of the underlying substrate.

      The invention includes such a cylinder wherein selected areas of said over layer have been removed to  
15 provide said cylinder with a desired printing pattern by exposing printing ink transferring surface portions of the substrate corresponding to the said printing pattern.

      The invention includes also a method for  
20 producing such a cylinder, comprising providing on a substrate cylinder a thin over layer of hydrophilic material, the substrate cylinder having a lipophilic surface.

      The invention includes a method for providing a  
25 printing pattern thereon, comprising removing selected portions of the over layer from a cylinder as

described above to form thereon a desired printing pattern by exposing printing ink transferring surface portions of the substrate corresponding to the said printing pattern.

05       The invention includes an offset printing machine incorporating a plate cylinder which is a cylinder as described herein.

10       The invention includes also a method of offset printing comprising applying offset printing ink to a cylinder as described above and transferring the ink to a printing substrate via a blanket roller.

15       The present invention provides also a printing cylinder which comprises a first layer of lipophilic material serving as a printing ink transferring medium, the first layer being covered by a second layer consisting of hydrophilic material, and the second layer being broken through within areas corresponding to the said printing pattern so as to expose active surface portions of the first layer.

20       The second or hydrophilic material layer, which is thus not wettable by conventional printing inks occurring in offset-printing, in accordance with the invention may be a very thin metal film, e.g. aluminium foil, which is applied in the form of a coherent, unbroken piece onto the lipophilic material layer of the printing cylinder and subsequently is

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broken through by means of an appropriate material-removing processing operation within the areas corresponding to the printing pattern. Such a metal film can be applied onto the cylinder surface in a very simple manner by glueing using an adhesive of a type known in itself which presents sufficiently good adhesion to both the actual materials so as to retain the metal film securely in position around the cylinder surface. If the lipophilic material layer is constituted of a thermoplastic material, such a metal film can be applied to the cylinder surface through sealing with simultaneous supply of heat and pressure so as to form a strong and durable sealing join between the two material surfaces.

15 In accordance with the invention, however, the hydrophilic material layer preferably consists of a thin coating of metal,

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e.g. aluminium, formed directly on the lipophilic cylinder layer by means of vacuum precipitation. This allows, among other things, to gain the substantial advantage that the coating so applied will be wholly free from seams and this, among other things, means

5 increased flexibility in the subsequent pattern design, since the so-called repeat length of the pattern can be selected quite freely. Irrespectively of which of the two said methods is used to apply the hydrophilic material layer to the surface of the cylinder, it is essential in accordance with the invention that the layer applied

10 ultimately should be very thin so that differences in height between the surface of the hydrophilic layer and the surface of the underlying lipophilic material layer are sufficiently small to allow them to be absorbed by a rubber printing cylinder which is used conventionally in offset-printing in order to transfer the inked

15 printing pattern of the printing cylinder to the object which is to be printed, e.g. a web of packing material.

In accordance with the present invention, moreover, a method is presented for providing a cylinder surface consisting of lipophilic material with a printing pattern for reproduction

20 through offset-printing, this method being characterized in that the cylinder surface is first coated with a very thin layer of hydrophilic material, and that the hydrophilic layer thereafter is removed along areas which correspond to the desired printing pattern so as to expose active, printing ink transferring surface

25 portions of the lipophilic cylinder surface.

The said coating of the hydrophilic layer is preferably carried out by means of so-called vacuum precipitation which is based on that the actual hydrophilic material in gaseous form is precipitated directly onto the cylinder surface under vacuum. The

30 method is very simple, inexpensive and makes possible a very thin, seamless coating of the surface of the cylinder.

To break through or remove the hydrophilic material layer within the said areas, preferably a computer-controlled laser beam is used which makes possible the burning off of the relevant

35 portions of the hydrophilic material layer with very high precision.

The invention will now be described in more detail with special reference to the attached drawing in which Figure 1 is a schematic perspective view of a cylinder in accordance with an embodiment of the invention, and Figure 2 on a strongly  
5 exaggerated scale shows an unbroken section along the line II-II in Figure 1.

In Figure 1 is thus shown schematically a cylinder 1 in accordance with the present invention with a printing pattern for reproduction by means of offset-printing located on the surface of  
10 the cylinder. The printing pattern in the example shown here comprises a number of identical oval-shaped pattern symbols 2 which are located parallel with one another and adjoining one another, intended for the printing of, for example, a paper web comprising in corresponding manner individual blanks arranged  
15 adjoining one another for the manufacture of packing containers, as has been described earlier. The actual design of each individual pattern symbol as such is of no critical importance for the invention, but naturally may be varied and may assume more or less sophisticated designs wholly in accordance with the printing  
20 pattern desired in each individual case. Moreover, the pattern symbols in respective rows may be somewhat displaced in relation to one another, such as is required in the printing of package webs comprising container blanks provided with projecting lugs.

The cylinder 1 is mounted around a horizontal axle 3 and  
25 comprises a carrier layer 4 consisting of lipophilic material, e.g. plastics, which is coated on its outside with a very thin covering layer 5 of hydrophilic material, e.g. metal such as aluminium.

The outer layer 5 may be constituted, for example, of a very thin metal foil applied in an unbroken layer around the plastic  
30 layer 4, but consists in accordance with the invention preferably of a seamless metal coating formed directly on the plastic layer 4 by vacuum precipitation. Certain areas (corresponding to the printing pattern shown schematically in Figure 1) of the hydrophilic material layer 5 are broken through so as to expose  
35 corresponding surface portions 6 (Figure 2) of the bottom plastic layer 4 serving as printing ink transferring medium. Such a

breaking through of the hydrophilic layer 5 can be achieved very simply in accordance with the invention by means of a material-removing working operation carried out on the material layer 5, e.g. burning off with the help of a computer-controlled laser beam  
5 which makes possible a formation according to pattern of the printing pattern selected with very high accuracy.

CLAIMS

1. A cylinder for use in offset printing comprising a substrate of lipophilic material to serve as a printing ink transferring medium, and an over layer  
05 covering said substrate and consisting of hydrophilic material, said over layer being selectively removable to expose a desired pattern of printing ink transferring regions of the underlying substrate.
2. A cylinder as claimed in Claim 1, wherein the  
10 said over layer is a very thin layer of metal.
3. A cylinder as claimed in Claim 2, wherein the said over layer is a very thin coating of metal deposited on said substrate by vacuum deposition.
4. A cylinder as claimed in Claim 2 or Claim 3,  
15 wherein said metal is aluminium.
5. A cylinder as claimed in any preceding claim, wherein the substrate consists of plastics material.
6. A cylinder as claimed in any preceding claim, wherein the substrate comprises an under layer of  
20 lipophilic material arranged on a carrier layer of dimensionally stable material.
7. A cylinder as claimed in Claim 1, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.
- 25 8. A cylinder as claimed in any preceding claim, wherein selected areas of said over layer have been

removed to provide said cylinder with a desired printing pattern by exposing printing ink transferring surface portions of the substrate corresponding to the said printing pattern.

05 9. A cylinder as claimed in Claim 8, wherein the said printing pattern comprises a plurality of similar pattern units running parallel with one another circumferentially of the cylinder, adjoining one another but circumferentially displaced with respect  
10 to one another.

10. A cylinder substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

11. A method for producing a cylinder as claimed in  
15 Claim 1, comprising providing on a substrate cylinder a thin over layer of hydrophilic material, the substrate cylinder having a lipophilic surface.

12. A method as claimed in Claim 11, wherein the hydrophilic over layer is provided on the substrate by  
20 vacuum deposition of a metal.

13. A method as claimed in Claim 12, substantially as described with reference to the accompanying drawing.

14. A method for producing a cylinder as claimed in Claim 8, comprising removing selected portions of the  
25 over layer from a cylinder as claimed in Claim 1 to form thereon a desired printing pattern by exposing

printing ink transferring surface portions of the substrate corresponding to the said printing pattern.

15. A method as claimed in Claim 14, wherein said selected portions are removed by subjecting them to  
05 the action of a laser beam.

16. A method as claimed in Claim 14, substantially as hereinbefore described with reference to the accompanying drawing.

17. An offset printing machine incorporating a plate  
10 cylinder which is a cylinder as claimed in any one of Claims 1 to 10.

18. A cylinder provided with printing pattern for offset-printing, characterised in that it comprises a first layer (4) of lipophilic material serving as a  
15 printing ink transferring medium, that the first layer is covered by a second layer (5) consisting of hydrophilic material, and that the second layer is broken through within areas corresponding to the said printing pattern so as to expose active printing ink  
20 transferring surface portions (6) of the first layer (4).

19. A cylinder in accordance with Claim 18, characterised in that the second layer (5) is a very thin film of metal, e.g. aluminium.

25 20. A cylinder in accordance with Claim 18, characterised in that the second layer is a very thin

coating of metal, e.g. aluminium, produced directly on the first layer by means of vacuum precipitation.

21. A cylinder in accordance with any one of Claims 18 to 20, characterised in that the first layer (4) consists of plastic material.

22. A cylinder in accordance with any one of Claims 18 to 21, characterised in that the printing pattern comprises a number of pattern units (2), preferably similar in their outer contour, which are located parallel with one another and adjoining one another, but displaced in longitudinal direction in relation to one another.

23. A cylinder in accordance with any one of Claims 18 to 22, characterised in that the first layer (4) is arranged on a carrier layer of stable material, e.g. sheet metal, ceramic etc.

24. A method for providing a cylinder surface consisting of lipophilic material with a printing pattern for reproduction through offset-printing, characterised in that the cylinder surface is coated with a very thin layer of hydrophilic material (5), and that the hydrophilic layer is removed along areas corresponding to the said printing pattern, so as to expose active printing ink transferring surface portions (6) of the cylinder surface.

25. A method in accordance with Claim 24, characterised in that the hydrophilic layer (5) is

produced directly on the cylinder surface by means of vacuum precipitation.

26. A method in accordance with Claim 24 or 25, characterised in that the hydrophilic layer (5) is removed along the said areas through burning off by means of a computer controlled-laser beam.
27. A method of offset printing comprising applying offset printing ink to a cylinder as claimed in any one of Claims 8 to 10 or 18 to 23, and transferring the ink to a printing substrate via a blanket roller.

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